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Consciousness and Human Development: A Dynamic Systems Perspective

Aparna Rao ¹

¹ Clinical Psychology, Fielding Graduate Institute, Santa Barbara, California, USA

Correspondence: Aparna Rao (arao33@gmail.com)

ABSTRACT – The study of consciousness has gained renewed attention from a variety of disciplines, such as psychology, philosophy, neurobiology and computer science. The inter-disciplinary topic of consciousness is now ripe for exploring the links to human development, from infancy to the pre-school years. Moreover, advances in dynamic systems theory enable an in-depth exploration of consciousness as an emergent developmental property that continually evolves in pursuit of greater coherence and increasing complexity.

Keywords:

Consciousness;
Developmental
psychology; Dynamic
systems theory; Self-
concept;
Neuropsychology

Introduction

Many scholars regard consciousness as the final frontier in the mystery of the human mind. Some have come to the conclusion that the towering problem of consciousness is intractable. As Demasio (1999, p. 4) put it, “What can be more difficult to know than to know *how* we know?” Yet, investigators from a variety of disciplines, such as psychology, philosophy, neurobiology, and computer science, have grappled with the nature of consciousness. In part, all of these investigators have recognized consciousness as one of the most distinctive features of human nature that has evolutionary underpinnings in ensuring survival. A simple starting point for many researchers is to consider consciousness as involving “an organism's awareness of its own self and surroundings” (Demasio, 1999, p. 4). Evolutionary scientists emphasize the human ability to *self-evaluate* and to *self-reflect*, a faculty that distinguishes human beings from many other animal

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relatives (Donald, 2001). Neurobiologists examine the neurological correlates of consciousness such as the frequency of neuronal oscillations and the role of the resulting reverberating cycles in the delivery and processing of conscious information (Crick & Koch, 1990). Modern cognitive theorists view consciousness as a cross-modal interface or a *global computational workspace* (Baars, 1988; Shallice, 1988), emphasizing executive functions, such as explicit *self-representation* and *self-monitoring*. Philosophers refer to the qualia or “felt quality” of a conscious experience that contributes to a heightened sense of self and the surrounding environment (Flanagan, 1992). Hence, even though it might be challenging to find consensus in the definition and the underlying mechanisms, ‘consciousness’ has gained renewed, multi-disciplinary attention in recent years. As Frawley (1997) noted, consciousness “has come back with a vengeance” (p. 121).

Human Development and Consciousness

The complexity of human mental development that has so intrigued researchers comes with certain trade-offs. One such trade-off is that tremendous resources (both internal and external) are required for ontogeny. Development of increasingly complex executive functions takes time, making the young human child relatively more dependent on adults, as compared to the young of other animal species (Donald, 2001). The ability to gather his or her own food and meet the basic needs of survival is highly infeasible for the human child in the first few years of life. Locomotion, i.e., crawling, begins, at best, at three months of age, and walking does not occur till 10-11 months of age (Crain, 2000). While non-verbal communication occurs relatively quickly, verbal communication of needs may take up to 15-30 months of age, depending on the child (Crain, 2000). Hence, it might be tempting to assume that infants and young children, on account of being such highly dependent beings, are egocentric, i.e., they are unable to take the perspective of others, and incapable of meta-cognitive activities such as consciousness. However, the confluence of research in developmental psychology, cognitive science, and neurobiology, has proven otherwise. The central goal of this paper is to highlight theoretical and empirical research that points to the emerging consciousness of a child, beginning as early as the first month of life, and extending to 4 to 5 years of age and beyond.

Consciousness: A Relational Phenomenon

Demasio’s (1999) definition of consciousness, mentioned earlier, alludes to an awareness of self and surroundings. One of the salient features of consciousness is that one can neither know the self in isolation, nor the surroundings in isolation (Baars, 1988; Shallice, 1988). Researchers are increasingly acknowledging that one can know the self and the surroundings only through their mutual interaction. Using an example of a child catching a ball, consciousness can be described as being aware of the ‘catcher’ (i.e., the child herself) in the act of catching a ball (Demasio, 1999). In other words, the ‘self’ can know itself while in the act of knowing the object (the ball). Hence, the question that arises is the following - can an infant begin to know herself through getting to know her adult caretaker(s)?

There is now increasing evidence from the confluence of research in developmental psychology and neurobiology that the primary caretaker plays a far greater role than mere survival

of the child. It has been shown that external experience can alter brain structures by maintaining, strengthening, or creating new synaptic connections (Siegel, 2001). Psychologists have long argued that the caretaker plays a vital role in affect regulation as well as meaning-making of the environment (Fonagy & Target, 1997; Stern, 1985; Tronick, 2001). In a remarkable test of the infant-mother social connectedness, Tronick and his colleagues (Tronick et al., 1978) created the Face-to-Face Still-Face Paradigm. In this experiment, the mother begins with normal interaction with her infant, and then at a certain point in time, suddenly becomes unresponsive by assuming a 'still face'. Results from such experiments indicate that there is a dramatic effect on the infant. Infants as young as 4 to 6 months are able to detect the change and go through an active solicitation cycle of a) attempting to regain their mother's attention, b) failing to do so, c) looking away and d) then looking back at her again. Eventually, as the attempts fail, the infants go into a state of dysregulation, losing postural control, and desperately looking for ways to self-soothe themselves (Tronick, 2001). In that one moment where the infant experiences the sudden unresponsiveness from the mother, the inter-subjective state between the mother and the infant is ruptured. One may argue that for that one moment, the infant experiences the terror derived from the implicit, 'felt sense' of somehow feeling separate from the mother. This is terrifying for the infant who depends on the dyadic collaboration of the mother, for both homeostatic balance and affect regulation. To use Demasio's (1999) analogy, the infant thought he was playing "ball" with the mother; but instead what was thrown back to him (the 'still face') was a foreign object with a potent and unrecognizable 'qualia'. Hence, it is entirely possible that for a fleeting moment, the infant experienced the non-contingent interaction as an implicit sense of his or her bounded existence, separate from the mother.

Context Dependence

Another way to explain the relational phenomenon is to recognize that consciousness, like development, is *context dependent*. Context dependence enables consciousness to fulfill one of its key services, i.e., to regulate the balance between the inner and outer world of an individual (Povinelli, 2001). Here, the distinction between non-conscious, conscious and meta-conscious processes becomes most clear. Activities fall on a continuum from relatively context-independent (non-conscious processes) to completely context dependent (meta conscious processes). Non-conscious processing has been described as an inner experience without a *situated* sense of itself as inner and personal. As Frawley (1997) noted, non-conscious processing is a "self without qualia" (p. 141). Homeostatic regulation is one such critical, *non-conscious* process for the growing infant. Conscious processes on the other hand, while being heavily situated in an inner world, represent an opening up of the private self to the outer world. Increasing levels of consciousness result in a resolution of choices present in the external world, the establishment of an internal point of view, and an inner subjectivity to discriminate and to make intentional choices (Searle, 1991). At the extreme, 'meta consciousness' requires the individual to take the stance of the 'other' and to be "conscious of being conscious" (Vygotsky as cited in Frawley, 1997, p. 29).

Within this contextual framework that allows for a continuum of consciousness (from non-conscious to meta conscious processing), the infant can no longer be considered as an isolated human being. Instead, the infant enters into a co-constructed experience with the primary

caretaker. At first, the infant is unable to distinguish external and internal worlds. One might say that it were as if the infant's conscious energy is intricately fused with the co-constructed, external space. Gradually, the growing child begins to see the internal world as being distinct and unique from the external world, through a process of *individuation* (Frawley, 1997). Increasing differentiation from the external world is accompanied by increasing integration and coherence of the internal world. The next section uses the framework of systems theory to further explain the phenomenon.

Consciousness: A Dynamic System

There is widespread acknowledgement in recent literature that certain complex psychological structures that develop during childhood are *not* reducible to elementary psychological functions. Vygotsky (as cited in Bozhovich, 2004) examined a child's consciousness as an example of a complex psychological system, with its own developmental logic and irreducible functional qualities. The system that forms a child's consciousness changes over time, achieving higher levels of integration over the course of development. According to Siegel (2001), such structures work as increasingly *differentiated* (distinct component parts) and *integrated* mechanisms (clustering of components into functions). Siegel (2001) defined integration as the "clustering of distinct, different, differentiated components into a functional whole" (p. 85). Once established, these integrated structures develop into stable structures that cannot be decomposed into individual components (Frawley, 1997).

Throughout childhood, greater and greater integrated functioning corresponds to achieving higher *complexity*. Complexity, according to Siegel (2001), can be defined as the oscillation of states between order, stability, and predictability on one hand, to variation and novelty on the other. Systems have a tendency to move towards maximizing complexity (Siegel, 2001). Translating this to the experience of the child, researchers are increasingly accepting the notion that moment-to-moment interactions with an adult can lead to lasting impact on the child. If the moment-to-moment interaction has the right balance of predictability and novelty, then a high level of complexity can be achieved. Neuronal patterns are activated and reinforced by the pattern of interpersonal interactions (Siegel, 2001). For example, a very coherent and integrated pattern of interpersonal interaction has been shown to promote linkages between neural networks that then reinforce the complexity of the structure itself (Cicchetti & Rogosch, 1997). A characteristic that is central to integrated, psychological structures is that stability is *dynamic*. In other words, these structures can change over the lifetime of an individual as new external and internal experiences occur over the course of time. Given the dependence on and unpredictability of the external environment, meta conscious progress occurs in uneven spurts rather than in a gradual, even manner (Frawley, 1997). A review of recent, empirical evidence in cognitive psychology presented next, reveals the 'when' and 'how' of these uneven spurts in consciousness at various points of childhood.

Dynamic Movement of Consciousness: From Infancy to Preschool years

The systems view allows for the possibility that the system that constitutes consciousness may itself change over time. Hence, the system of consciousness at *infancy* may be less complex than

the system during toddlerhood, but yet very much present. Herein lies the opportunity to examine properties of consciousness that surface at each stage of the growing child. Borrowing terminology from developmental psychology, what are the ‘milestones’ or stages of consciousness? Research in developmental psychology has shown that over the first 4 to 5 years of life, there is an increasingly complex organization of mental systems in the service of developmental tasks such as perception, memory, etc. (Nelson & Shaw, 2000). One can think of ‘consciousness’ as running lockstep with development tasks, having its own developmental logic and chronology.

William James (as cited in Rochat, 2003) distinguished between two aspects of self: the existential self or agent of activity, denoted as “I,” and the empirical or categorical self, referred to as “me.” Classical theories of development held the position that infants are born in a ‘blooming’, ‘buzzing’ state of confusion and thus incapable of self-world distinctions (Howe et al., 1994). However, creative research designs have shed new light on aspects of their existence that infants may be conscious of. Martin and Clark (1982) tested forty-seven newborns within the first days of their birth in a counterbalanced research design. Calm or crying babies were made to hear recordings of their own cry or the cry of other babies. Previous studies had documented the tendency of newborns to cry at hearing the cries of other babies. Martin and Clark’s study went a step further, by demonstrating that both calm and crying newborns cried significantly *more* when they heard the cries of *other* babies as compared to the recorded sound of their own crying. This would imply that the newborn is somehow able to recognize her own vocalizations and discriminate them from other babies. Martin and Clark’s (1982) experiments showed that the infant’s response to crying is species, peer and self-specific. Butterworth (1990) argued that such experiments point to the origins of the categorical or empirical self “me” at birth. These experiments seem to indicate that *auditory specification* of self at birth is one of the preliminary properties of developing consciousness, whereby the infant can make distinctions such as ‘like me’ and ‘not like me’.

The self-world differentiation demonstrated above through auditory stimulation, has also been examined in the sphere of *touch* stimulation. A study by Rochat and Hespos (as cited in Rochat, 2003) pointed to the tendency of neonates to root significantly more to external touch versus self-stimulation. Rochat (2003) argued that a prime reason is that infants can differentiate between self and non-self touch. The transport of the hand to the face is a unique tactile experience, as it involves a ‘double touch’ – the hand touches the face, while the face touches the hand. Double touch is perceptually reinforcing and self-specifying. One might argue that the distinction between externally produced versus self-specifying perceptual experiences lays the foundation for an infant’s emerging consciousness.

Around the two to three month mark, infants have been shown to demonstrate systematic body image matching by imitating external representations. Meltzoff and Moore (1992) found that 6-week old infants tend to systematically copy the tongue protrusion of an adult model, in the *same* approximate (reflected) direction as the protruded tongue. As Rochat (2003) noted, this would imply that not only do infants differentiate themselves from the ‘other’, but they also have an internal mapping of their own bodily space. The sense of *situated self* enables infants at two months and older to participate in activities such as turn taking and imitation. Researchers refer

to such back-and-forth interactions as *proto conversations* as they mimic the structural logic of real conversations (Gergely & Watson, 1999).

Studies have shown that infants have a strong preference for novelty (Bahrick et al., 1996). Given the novelty preference, one might ask the cynical question that in experiments mentioned above, are infants simply making a differentiation between invariant, familiar features versus the novel features? In other words, is it possible that infants do *not* have a sense that their own invariant features stand for themselves? Perhaps, a more compelling piece of evidence for emerging consciousness occurs at around 18 months of age, via the famous “post-it” experiment (Bertenthal & Fisher, 1978; Povinelli, 2001). The latter researchers found that infants at eighteen months of age with ‘post-it’ notes stuck on their forehead view their own specular image in the mirror and reach for the post-it note to remove it. Prior to this age, infants show no signs of reaching out to their own body when they see the post-it note through the mirror. At 18 months and older, infants are able to refer to the specular image as an external representation of their body, and are therefore conscious of a *represented self*.

It has been argued that despite sporadic identification of a represented self, young toddlers (between the ages of two and three) are still ambivalent and tend to oscillate between viewing the mirror image as self-represented-in-the-mirror versus as someone else-represented-in-the mirror (Povinelli, 2001). As Povinelli (2001) found, *permanence* of the represented self depends on a *temporal* sense of self beyond the immediacy of a mirror experience. Povinelli (2001) conducted a series of experiments on delayed self-recognition that demonstrated that it is not until 3 years and older that children grasp a sense of self with a temporal dimension to it. Older toddlers are able to grasp a sense of self that pertains not only to what is being experienced in the here and now, but also to what was experienced in the past and to what will be experienced in the future. This is a clear example of how consciousness might climb lockstep with developmental capacities such as autobiographical memory. Between the age of 2 and 3 years of age, children begin to narrate past events that involve self, place and time (Howe et al., 1994). Howe et al (1994) argued that the emergence of these personally coded memories is intricately linked to the emergence of a higher stage of consciousness:

Since autobiographical memory by definition is memory for information and events pertaining to the self, it is only with knowledge of one’s self as an independent entity that experiences can be organized in memory as personal or autobiographical. (p. 330)

Prior to the age of 2 or 3, one can think of a combination of perception and implicit memory as supporting a more global but vague sense of consciousness. With the advent of autobiographical memory, there is an *ontological shift* whereby the child can now view a sense of invariant self as extending across time (Howe et al., 1994). Nelson (1994) noted that pre-school children can converse about the past and thereby consolidate autobiographical memory through linguistic means. Adults play a vital role in providing the scaffolding assistance needed for accurate recall (Nelson, 1994). Hence, the linguistic and social aspects of autobiographical memory go hand-in-hand with a heightened sense of a temporal self.

Language certainly plays a large role in a child’s emerging consciousness by promoting symbolic representation and symbolic meaning-making (Nelson & Shaw, 2000; Povinelli, 2001).

Language enables children to think and talk about the causal agent “I” as well as to describe the categorical “me.” The use of markers that designate past tense (e.g., -ed) represents a shift in reference frame from the ‘here and now’ to the ‘there and then’, providing the basis for the narration and organization of personal experiences.

Vygotsky (as cited in Frawley, 1997) proposed that initially, language and thought undergo a parallel development, originating from opposing focal points. Language originates from an external, socially derived source. Thought has a private, internal source. In addition, while language develops from small to large and from word to phrase, thinking and perception move from large and vague to small and precise. Frawley (1997) went on to elaborate Vygotsky’s view that a higher stage of consciousness is reached at the point of convergence of language and thought. “When the parallel developments of outer speech and inner thought converge, meta consciousness and the voluntary control of thought and language result” (Frawley, 1997, p. 91). In other words, after some amount of parallel, concurrent development from an internal and external source respectively, thought and language intersect. At this point, thought becomes verbal and speech becomes thoughtful. Language serves to increase the sharpness of thoughts, while thoughts serve to make language meaningful. Some researchers argue against the parallel development of language and thinking, by citing the development of an internal natural language. In other words, these researchers address the question – to what extent is language involved in thinking? Carruthers (1996) cited the case of congenitally deaf children, noting that they spontaneously develop a gesture language. The gesture language of these children was found to follow “exactly the (same) stages of development and spontaneous restructuring as do those of children acquiring ASL” (Carruthers, 1996, p. 44). This may point to the development of an *internal* natural language that serves not merely a communicative function, but also a *cognitive* function in human conscious thinking.

In the preschool years, a consequence of the development of higher order cognitive faculties, such as language, thought, and memory, is that they all begin to work in concert. These faculties jointly enable the child to hold symbolic meaning and to experiment with new possibilities. Experimentation takes the form of pretend plays whereby pre-school children are able to simulate roles and take on the point of view of others (Tomasello et al., 1999). Donald (2001, p. 263) referred to this evolutionary feat as ‘mimesis’ whereby a child develops the cognitive capacity to consciously elaborate *and* suppress emotion. From an evolutionary point of view, the ability to mime and create an imaginative reenactment of an event is a significant beginning of abstract representation (Nelson & Shaw, 2000). It also serves as a systematic rehearsal and improvement of skills, so that a child can learn a set of action sequences needed for social learning. In the words of Merlin Donald (2001), “mimesis is the level of cultural interaction on which we first assume a basic tribal identity and become conscious of ourselves with reference to our primary social group” (p. 266). It is at this age then, that children begin to develop a sense of feeling evaluated by others. They are aware that they exist not only in their own minds, but also in the minds of others. The *evaluated* self gives birth to the so-called ‘secondary’ social emotions such as embarrassment, self-consciousness, pride, shame, etc. (Lewis, 1992). The preschooler’s growing imagination and affinity to fantasy feed the cognitive ability to run simulations of other people’s minds (Rochat,

2003). This in turn feeds a growing sense of meta-consciousness or as Vygotsky put it, taking the stance of the ‘other’ to shed light on the private self.

Consciousness and Psychopathology

The preceding section elaborated various stages of consciousness emerging in a continuum-like manner from infancy to the pre-school years. As discussed previously, the environment and resulting relational experiences are vitally important for the development of consciousness in the growing child. In addition, the right balance of predictability and creative novelty in interpersonal interactions can support *higher-order* abstract processing of the neo-cortex (Damasio, 1999; Siegel, 2001). The infant's brain represents sensory information, directly perceived from the outside world, in the form of ‘first-order’ neural maps. Damasio (1999) referred to the ‘proto-self’ as being a result of direct sensory experience of the external world. The proto-self changes as a result of interaction with ‘objects’ that may be physical objects in the external environment, or internal object-images. Core consciousness can be thought of as a phenomenon of heightened self-awareness that results from the action of *second-order* neural processes to record the change in the proto-self from before to after the interaction with a particular ‘object’. Hence, as Siegel (2001) summarizes, “Core consciousness is a ‘here-and-now’ experience of focused attention that is fundamentally a measure of how the proto-self is changed by interaction with an ‘object’ in the internal or external world” (p. 75). Between the ages of 2 and 3, the development of autobiographical memory makes possible the process by which a *third order* grouping of neural structures can record changes in the core-self over time. At this point, the child is able to remember past experience, compare it to the present and prepare for the future. This phenomenon of temporal self-awareness has been referred to as ‘extended’ consciousness (Damasio, 1999) or ‘autonoetic’ consciousness (Tulving, 1987).

The above discussion on emerging consciousness is based on the *normative* experience of a growing child. However, what if the affective experience in the moment-to-moment interactions was one of disorganization, fear, terror, or pain caused by the external environment? What if a chronically negative affective experience with a primary caretaker occurs before the child developed an explicit, autobiographical memory? One might argue that the development of consciousness is *arrested* or *stalled* due to the impact of trauma on affect and self-regulation. Affect theory suggests that certain primary emotions such as fear, anger, joy, etc. are physiologically pre-programmed in the human infant (Nathanson, 1996). When made *conscious*, these affects are known to the organism as *feeling* (Damasio, 1999; Nathanson, 1996). Affective resonance with the caretaker serves to modulate or amplify certain emotions and bring them into consciousness. Hence, if the predominant emotion during interactions is one of fear or terror in the infant, then the chronic over-amplification of that negative emotion triggers the physiological correlate of that emotion in the infant i.e., a *stress* response. Relational trauma in infants has shown to trigger one of two distinct, physiological stress patterns – hyperarousal or dissociation (Beebe, 2000). Hyperarousal is available to infants earlier than dissociation, and is the sympathetic response of the autonomic nervous system. Hyperarousal involves an increased heart rate, higher blood pressure, heavier respiration and tight muscle tension. Dissociation, the later-forming response pattern to trauma, is a parasympathetic strategy, involving numbing,

avoidance, withdrawal, and lack of postural control. In a state of hyperarousal or dissociation, core consciousness of the present, i.e., the felt sense of knowing is too horrifying to bear. Homeostasis is affected, and all the organism's resources and energy are devoted to regaining equilibrium. The sense of permanence of the represented self is shaken at the core, in the face of an inconsistent, unpredictable, and dangerous external environment. The traumatized child is constantly on the watch and it is as if he or she were permanently poised for fight or flight (McAlister Groves, 2002). In a sense, relational trauma attacks the armor of consciousness before it is fully built. Emotions flood the brain, triggering a 'regression' in consciousness to an undifferentiated, diffused state of being. The integrative capacities of the orbitofrontal region of the pre-frontal cortex are disrupted (Siegel, 2001). In the face of trauma, it becomes challenging for the growing child to achieve the bi-hemispheric integration needed to build a coherent narrative. Hence, autobiographical memory and a sense of a temporal self across time are also disrupted.

The age of a child is crucially important in determining the extent to which the 'armor' of consciousness is damaged. Trauma occurring at infancy can look and feel very different from trauma first occurring in the pre-school years. Infancy is a stage during which aspects of the environment are coded in a global, composite and amodal manner. The presence of implicit memory implies that consciousness is marked by a global sense of knowing emotions such as fear or frustration. The lack of context-rich explicit memory prevents the infant from situating the trauma in a temporal context. Hence, in the absence of 'extended' or 'autonoetic' consciousness, trauma takes on a horrifying, engulfing presence. Experiments in infant research have shown that repetitions of a particular encounter, even if not exactly identical, can effectively prime infants to unconsciously retrieve a memory response for every subsequent encounter (Gerhardstein et al., 2000).

During the pre-school years, Piaget (1965) pointed out that children have a rudimentary understanding of cause-effect relationships. The pre-operational period is characterized by *transductive* logic whereby two separate events occurring closely in time receive cause-effect attributes. For example, a child may reason that he did something bad yesterday which is why something bad is happening to him today. In addition, *egocentrism* is also a dominant feature at this age, serving as an organizing principle to explain the causality of events. Put together, transductive logic and egocentrism may cause child victims of abuse to blame themselves for terrible things happening to them (McAlister Groves, 2002). In essence, a child is unable to go 'meta' or 'above' the experience into a higher state of consciousness. A primary reason is that the lack of coherence in the environment makes internal coherence next to impossible. For example, children who witness violence "begin to see their world as unpredictable, dangerous and hostile" (McAlister Groves, 2002, p.46). This phenomenon can be understood through the cognitive feat of *centration* common to all children in the pre-operational stage (Piaget, 1965). In the first seven years of life, Piaget (1965) noted that centration enables focus on a narrow range of information. While it may be a highly effective learning strategy, centration can produce limiting beliefs and inflexible schemas in the face of adversity. In reaction to chronic adversity, a child may lose sight of the higher-order alternatives and be unable to utilize positive experiences from the past to compensate for the adverse experiences of the present. In terms of brain function, the 'lower

order' somatic and emotional processing of the limbic structures is *not* counterbalanced by the development of 'higher order' abstract processing in the neocortex (Siegel, 2001). Hence, extended (Damasio, 1999) or auto-noetic consciousness (Tulving, 1987) is out of reach, and the child is a 'prisoner' in the present (Edelman, 1992). Is there hope for such a child? As elaborated below, consciousness is an ongoing process and it is entirely possible that scaffolding provided by positive experiences in therapy or by a caring adult, can positively change the 'script' of consciousness.

Concluding Thoughts: A Negotiation Between Culture and Creativity?

Consciousness has been regarded as an evolutionary triumph in that the 'self in the act of knowing' is advantageous for the survival of an organism (Donald, 2001). Consciousness orients the entire apparatus of the human being towards self-preservation and growth. Consciousness can be viewed as a continuum from context-free, non-conscious processing at one end to context-dependent, meta-cognitive consciousness. Growth of consciousness is bi-directional. This can be seen from the bi-directional movement of cognitive faculties. Symbolic meaning and language originate from the external environment and grow inwards, while perception and thought have internal focal points and expand outwards (Frawley, 1997). Symbolic meaning and language start out as small and precise and gradually envelop large internal concepts and expressions. Perception and thought start out as large and vague, gradually becoming sharp and punctuated as they move outwards. Affect, like cognition, is bi-directional in the role it plays in consciousness. Affects originate from both the infant and the environment, interacting in the interpersonal field. As has been previously elaborated, primary affects are pre-programmed in the physiology of an infant, and therefore have an internal source (Nathanson, 1996). Influences from the external environment serve to amplify or modulate these affects, rendering these affects as conscious, internal feelings.

The bi-directional quality of evolving consciousness can be understood as a juxtaposition of internal creativity and external culture. As researchers such as Vygotsky (as cited in Frawley, 1997) and Donald (2001) noted, external culture acts as scaffolding system to a child's ongoing cognitive and emotional development. Meaning is created in reciprocal interactions, such as reciprocal eye contact, hugging, tum taking, shared attention, etc. This outside-inwards phenomenon then begins to dictate a script of consciousness in the growing child. The internal script of consciousness enables the child to begin to know herself and to know what 'tribal existence' within a particular tribe or culture feels like (Donald, 2001). The growing child's faculties for active imagination and fantasy serve to generate internal simulations of external realities. The child begins to discover that internal representations can be *expanded* upon with newly gathered 'tools' such as symbolic reasoning, working memory, and language. This expansion leads to new possibilities and can be defined as creativity itself, i.e., "the ability to generate new ideas and artifacts" (Damasio, 1999, p. 315). As creativity begins to move from the inside outwards, it begins to *negotiate* with the reality of the external culture. Negotiation itself results in a higher-order process – meaning making of the meaning making. Hence, it is entirely possible that as long as creativity is alive and as long as an individual lives amidst a social context or culture (which we all do), consciousness undergoes an ongoing evolution, well beyond the first

five years of life. Consciousness can be thought of as a continually evolving script, in the pursuit of greater coherence and increasing complexity.

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